LISBOA SCHOOL OF ECONOMICS & MANAGEMENT

# MASTER OF SCIENCE IN FINANCE

## MASTERS FINAL WORK

DISSERTATION

# CORPORATE GOVERNANCE AND THE IMPACT ON GERMAN COMPANIES' PERFORMANCE

JOÃO PEDRO LOURENÇO FERNANDES

SEPTEMBER 2013

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# ABSTRACT

What is the relationship between corporate governance and performance? This study helps to understand this question and examine this issue on the German market. Results drawn from an analysis of a sample of 61 German quoted companies over the period 2005–2008 provide support for the Germany specific characteristic of the employee representation on the board of directors and its positive relation with performance. The research provides evidence of positive impact on performance of older CEOs and Supervisory Board variable remuneration, on the level of operating performance measures. Shareholder concentration has a positive effect on the market based performance measure studied. Evidence regarding the type of owner, shows companies held by the State have better performance on average.

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# 1. Introduction

The corporate governance was once defined as "the system by which companies are directed and controlled" (Cadbury Committee, 1992) and is still the most usual definition. In other words, it is not just the directors' obligations in the company to suit stockholders, as it "involves a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined." (OECD, 2004), and consists of the entire structuring and controlling of the company.

One of the most discussed points in corporate governance is the principal-agent issue. In firms where there is a separation of ownership and management, and the shareholders do not have control, the issue arises among the management, which may have very different interests than shareholders. The greater danger comes from the possibility that rather than overseeing management on behalf of shareholders, the board may become subordinated to management (Bebchuk & Fried, 2004).

A major point of discussions focuses on the impact of a corporate governance system on financial and economical efficiency, with a strong emphasis on shareholders' welfare (Bowen, 1994).

The question of this research is how the adopted corporate governance measures explain the financial performance of the companies. This study will focus on the German market, and will comprehend the companies of the HDAX index, that comprises the 110 companies. This index aggregates the DAX, MDAX – the 30 and 50 largest traded companies listed on the Frankfurt Stock exchange, respectively – and TecDAX – the 30

largest technology shares in Prime Standard below DAX. It has the 110 most highly quoted companies on the segment of blue chips considered as Prime Standard companies and thus is an established indicator for the performance of the German economy as a whole.

## 1.1 Problem Statement and Importance of the Research

There is not one system of governance better than the rest, the Germanic model is the one used by companies in the German market, and although some authors may defend it as the most efficient model one cannot state it with absolute certain. A necessity of a taxonomy that brings up the advantages and disadvantages of each systems of governance is essential, and it is as important to developed and acknowledge what variables affect the system. In Germany there are some studies about the Germanic governance model but it is not clear what variables have greater impact on the financial and economic performance measures and what differences do those variables make on the companies of the same index and country.

There are several theories in corporate governance: theories of the company, theories of corporate governance models, theories of management and so on. Despite that, some of the theories contradict each others and there is no evidence that one should follow any of them without questioning. Recently there have been some financial scandals, undermining some theories and policies of the governance models that qualify themselves as the better ones, or seen by the researchers and those with knowledge in the area, as well structured and reliable models. Corporate governance has been seen as one of the most controversial areas of corporate finance in the last years, maybe because of these scandals that shocked the world, or other smaller cases that had impact only some countries, and crucial to

companies to make sustained and "good looking" decisions regain the trust of investors and improve their results.

Some of the variables studied in those theories will be deeply tested in this study.

I will take into account the main points of the German legislation about corporate governance and how it limits the power of companies to make their decisions about it.

This study will try to answer some questions with lack of studies as if employee representation on the board influences performance? Or support others previously studied as: How can the number of members in the board influence the performance of the company? Finally the principal focus and the main question of this study is to understand what are the variables that have a greater impact on a firm's performance and what policies the companies should take into consideration.

This research will take into account past theories, make a compilation and test some hypotheses, using an econometric model that will show which variables are significant. Research on corporate governance is not only of theoretical importance, but of practical importance as well.

# 2. Literature Review

## 2.1 Theories of Corporate Governance

Starting the review of the existing literature (see Appendix 1, table 1 for a summary), we have an overview of the Managerial Revolution with the study of Alfred Chandler Jr (1977) in the United States in a research with three major chapters. First chapter explain the emergence of the first multi-unit business, with several operating units geographically dispersed, which led to the need of a managerial hierarchy to oversee their activities and mostly adopt an offensive strategy of expansion. Then, the Ascendancy of the Manager

chapter shows how the modern business, in which the managers held the corporations, took the position of the previously consensual family or financial held companies during the 20th century. The influence of the employees began to grow and the Government intervention became scarcer. For the last chapter the author states the managerial capitalism started in the US because of its size and type of market and took longer on Europe and Japan because of their dominant family capitalism. Now, we need to understand the theories regarding corporate governance, and this will be divided in the central theory, the theories that conflict with it, and finally the most recent developments and achievements regarding the theories and governance systems.

In Corporate Governance we can consider one theory as one of the oldest and during a long time most widely adopted and consensual among researchers of the field, it is the **Agency Theory**. Its first appearance dated 1932 by a Berle & Means (1932) study, coming from the so fashionable discussion of the separation of ownership and control. The concept of Modern Corporation, where the capital requirements led to the need of separating the principal from the contracted agent in order to maximize all shareholders utility, instead of just the owners' wealth. Later in 1965, Adolf A. Berle (1965) continued its research on the flaws of the Classical economic view, in the form of a response to the Neoclassicist Peterson (1965). This essay explains that Peterson's neoclassical theory is wrong in some aspects, mostly in the conclusions that investment, production and distribution, and the position of ownership maintained in the traditional way. First, the author presents some fact phenomena, amongst which the large corporations dominance of the market decisions, distributions of ownership between individual and institutional stockholders, the increase in the personal-owned wealth and the accumulating depreciation allowances and undistributed profits as major source of capital, while the Classical economic theory considers no such changes. In the second topic the author explains that

the shift in Capitalism control is a consummated process with the raise of managers' control on the companies' decision making process and the stockholders minor importance on strategic decisions. Then the immutability of classical economic principles as Competition and Maximization of profit need to be modernized in order to achieve the objectives. Finally, the last statement is that in terms of injecting capital into corporations, stock market is residual, because the invested money doesn't go to the company, it only changes hands. In 1976, post World War II, Jensen & Meckling (1976) made a great contribution to the Agency Theory, defining the principal-agent relationship as:

"a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent. If both parties to the relationship are utility maximizers, there is good reason to believe that the agent will not always act in the best interests of the principal." (Jensen & Meckling, 1976)

With this relationship arise the agency costs as monitoring and bonding expenses and the residual loss. Jensen & Meckling also developed the "ownership structure" of the firm, replacing the term "capital structure", including to the structure of debt and equity, the separation of equity, the part held by managers (inside equity) and the portion held by outside investors (outside equity). Another significant aspect of their research was the establishment of a new definition for the firm, a set of contracts among individual production factors with the existence of divisible residual claims on the assets and cash flows, in contrast to the single product entity with the purpose of maximization of profits on the classical vision (Clarke, 2004). Fama & Jensen (1983) focused on the separation of the three major functions of agents, the decision making, the decision control and the residual risk bearing and if it's appliance is better than the combination of all functions on

the same agent. For some types of corporations as financial mutuals and large professional partnerships, amongst others, they concluded the combination of management and risk bearing, controlling the agency problems, would be efficient. While on small partnerships and closed corporations the combination of management and control functions, restricting residual claims, would bring potential benefits. Just like other studies, Fama & Jensen (1983) suggest internal and external corporate governance instruments as the presence of a board of directors to monitor the executives decisions. Another mechanism is the existence of golden parachutes, proposed by Jensen (1984). Finally, we can find some proponents and some critics to this theory, as Eisenhardt (1989), who asserts the theory at some point resembles to political models in the matter of the self-interested behavior with the purpose of reaching individual utility which leads to conflicting situations. Another importance of the theory is it proffers understanding of information asymmetries, risk bearing, corporate control and incentives in organizations. At the same time, other authors argue the theory is limited because it diminishes the company to two members only, managers and shareholders, acknowledging them as "self-interested humans, unwilling to sacrifice personal interest" in the behalf of the corporation (Daily *et al*, 2003) and further the assumption of the utility-maximizing self-interested human behavior which is inaccurate and the propensity to see the firm in contractual terms only (Learmount, 2002). The Agency approach was not consensual, therefore some theories opposing it arose; the first we will talk about is the **Stewardship Theory**.

Donaldson & Davis (1991) contested the agency theory affirming the hypothesis of the managers serving their own interests and gains goes against what they consider as essential, maximize the shareholders value and by consequence the managers' utility functions. In the Stewardship theory these managers are the stewards, who understand that by working in a collectivist way and achieving the organizations' goals will provide them

a greater utility, this way they have an extensive authority and lower temptation to act to their own goals, consequently stewards are trustworthy and the costs of monitoring them will be reduced. Later, Davis *et al* (1997) have compared the two theories psychologically, characterizing the stewards by their reaction to intrinsic rewards and high value commitment with the corporation, in opposition to the agents that react to extrinsic rewards and externalize organizational results avoiding the blame.

Concluding the study, the authors propose a way to chose between theories, by assessing the motivations of managers - who can choose to behave as stewards or as agents - and shareholders to understand the relationship among them. If both behave in agreement, choosing the agency theory the costs of the firm will be minimized in order to achieve the best short-run results, if they act according the stewardship theory the lung-run sustainability and potential performance will be maximized. Finally, if they oppose each other, who chooses the stewardship is the one betrayed and the one who chooses agency is considered to be opportunistic.

Then the second group of theories criticize the agency in what the directors' role in the company should be, the **Managerial Hegemony**, has in Mace one of its supporters.

Mace (1971) starts his study stating there is plenty of literature regarding the boards of directors but in his vision the problem is that these studies lack on the specification of the boards' appropriate functions, and the author tries to understand the behaviour of the directors. There are two aspects, according to Mace, that can affect the roles of the directors: their process of selection and their motivation to the proposed position. What they understand directors should do is to define strategies, policies, be involved on the decision-making process of the company, define its strategies and policies and stipulate accurateness levels to the managers and CEO. But in its view they are much more limited

because, in general, the directors have three actual functions on the company: advice, be an example of discipline to the president and lower managers and decision-making in crises situations only. Finally, Mace concludes directors are dispensable on the company since their part is almost irrelevant even stating they are just ornaments. In time of crisis there is a strong possibility of collision between the CEO/Chairman and the directors of a company, especially if they have different visions on what is best for the company. In order to solve that it is necessary to understand clearly what the tasks and power of each intervenient are. After the perspective of Mace on this subject Lorsh *et al* (1989) acknowledged the opinion of the Business Round who state the directors should supervise management and corporate social responsibility, with a different perspective the American Law Institute, yet a compatible view: elect, evaluate and dismiss the executives are the responsibilities of the directors. After analyzing the regulations, the authors claim an urgent need for change on the rules of governance of the stock exchanges and the corporations' laws. By supporting the managers' importance in the firm, the **Upper Echelons Theory** view collides with the Agency view.

The analysis of Hambrick *et al* (1984) on the upper echelons focuses not only on the chief executive office but on the entire top management body. Their first objective was to find characteristics that can link top managers to each others as much as characteristics that tear them appart and from that point undestand which ones are relevant to the company's strategies. They developed a model to understand how the organizational outcomes are related to the charateristics of its top managers, always with special attention on their roots and background rather than psychological aspects. More specifically they present some hypothesis, amongst them are age, functional track, other career experiences, formal education, socioeconomic background, financial position and group heterogeneity.

In 2007, Hambrick (2007) wrote an update to his previous article in which the main improvement on his study is the new variables, introducing the managerial discretion and the type of market the company operates in (as prominent of the top managers' decisions), influencing the theory's predictive strength. Other matters are integrated as if the managers' behaviour is innate or persuaded and the discussion about the executive's impact in different counties' systems. Besides that the author reinforces that focusing on the top managers instead of just the chief executive will provide stronger evidence and explains the theory proposes executives - as result of their background experiences and values - act based on their personnel interpretation of the companies' dilemmas.

So far, we just mentioned theories oriented to understand the behavior of organizations internally and in terms of intentional managerial decision making, but now we will focus on the theories of **External Pressures**, more oriented to a different dimension of governance acknowledging the relations with the external environment. Supporters of this theory state the importance of directors in a mission other than monitoring and supervisory. As Hillman et al (2000) said the directors of the board may provide better relationships with other social groups. In theory, more directors create links and cover more external resources, acting to reduce uncertainty. In addition, some authors as Lawrence and Lorsch (1967) and Pfeffer (1972) argue that internal managerial decisions are made to match external demands; inclusively Boards' size and composition are "rational organizational responses to the conditions of the external environment". Jones *et al* (1997) explain what is the network oriented system, where they identify some key aspects: patterns of interaction with informal collaborations within firms and long term exchanges that creates inter dependency; flow of resources between independent and separate units. In their words, network governance is a "select, persistent, and structured set of autonomous firms" therefore one cannot call an "industry or region a "network"

without examining relations among the firms and how these relations complete a product or service." According to Jones *et al.* (1997), network oriented system as the one in Germany, is "suited for industries with high levels of demand uncertainty, short product life cycles and where the rapid dissemination of information is critical" and is also increasing its importance, even they are difficult to implement, will become widespread in short time.

This transports us to the **Stakeholders Theory**, one of the theories that more directly opposes to the Agency theory, arguing the view of pursuing shareholder value and that stockholders are the only important individuals is wrong because all stakeholders, or all agents directly or indirectly related to the company are important and must be taken into consideration. Stakeholder Theory didn't had much interest of the managers until recently, when Freeman had his first research on the topic. Freeman & Reed (1983) considered two types of stakeholders: the internal stakeholders - the stockholders, managers and employees - which relationship create the strategic prospect for the company; and the external stakeholders, basically individuals who are indirectly related with the firm as suppliers, competitors and special interest groups, and are restrained by formal and informal policies (see Freeman, 1994). On 1996 Margaret Blair (1996) agreed with Freeman and Reed in the point that corporations should be considered as "arrangements for governing the relationships between all of the parties that contribute with specific assets to the firm" rather than just assets belonging to the shareholders. More recently Thomas Clarke (1998) defended major companies gave great importance to internal stakeholders as employees but also to external as customers and suppliers, showing leading companies have been adopting the stakeholders theory for longer time.

Recently a stream defending the **convergence** of the corporate governance systems form all countries to the Anglo-Saxon system. According to Nestor & Thompson (2000), the globalization of market capitals, new financial instruments and international competition are some of the causes to the pressures companies have been suffering to adapt their governance and to converge to the Anglo-Saxon model, while Useem (1998) highlighted the opening of the markets and the attenuation of the national limits. Despite that some authors don't agree with them, Guillen (1999), Rhodes & Apeldoorn (1998) and Branson (2001) are some examples of the skeptics about the convergence affirming corporations are dependent from legal and institutional practices and political dynamics. In addition even if the market is going into a more liberal state, the countries models and their past-dependence will drive them to an adjustment to the evolution of the economy and finance, not to a complete convergence. In 1999, OECD (1999a) tried to guide companies in different countries in order to deviate them from the total convergence of the practices but to lead them to the principles of responsibility and transparency.

Finally, some authors confront the evolution of the companies' strategy with the problems of the shareholder value pursuit. Lazonick & O'Sullivan (2000) made a **critique of shareholder value** and started their work with an important analysis to understand how the evolution of the strategy of the companies in the United States was from 1960 when the strategies of the corporations were oriented toward retention of the earnings to reinvest (retain and reinvest) them with the purpose of corporate growth but it ran into problems that led to its end. First the problem of too much growth with "too many divisions in too many different types of businesses" which make that the central offices were far from the operations and couldn't make smart decisions in order to explore the retain and reinvest strategy. This resulted in poor performance and showed the way to the origin of new and innovative competitors, the second problem. Primarily Japan challenged the US in

industries they were leaders for many years as in the mass production industry of automobile and electronics. Struggling with these problems, a group of economists came up with a new theory, the agency theory in the 1980 decade when top managers were under considerable pressure to adopt a shareholder value orientation; in Europe managers felt the same pressure in order to have credibility among the international markets and believed the maximization of shareholder value (downsize and distribute) was a principle of good governance.

They came up with some conclusions about the sustainability of the economy relating to the maximisation of shareholder. They affirm the foundations of the current prosperity may not be a result from this strategy as some economists say, "the prosperity of Silicon Valley in the 1990s owes more to the postwar "military industrial complex" in which "retain and reinvest" corporations were central than it does to a resurgence of entrepreneurship". Finally, they attack the strategy stating that companies are completely dependent of the performance of the stock market, some even finance themselves by the willingness of employees of accepting shares as compensation, and do not know their capacity to keep supporting it through downsize and distribution. Ending up suggesting that the pursuit of the shareholder value is a strategy for running down a company and "the pursuit of some other kind of value is needed to build up a company and an economy".

After the Enron bankruptcy some authors published articles countering the hypothesis of convergence of all models to the Anglo-Saxon enhancing some problems of the model and the policies companies' have been following. The article of Jeffrey N. Gordon (2002) enhanced some problems of the model. First, concerning the Efficient Market Hypothesis, the author concludes the market don't understand the intrinsic value of the stock and its gap to the market price. Then he states the small independence of board members and their

lack of oversight of the managers and information provided. Then the Stock-based compensation is a reason to the crisis previously stated because of the high-power given to the executives, which is supposed to control the appeal of managers towards non ethic situations but instead of that, due to the excessive performance compensation values, the managers became risk-lovers taking projects with high risk. Last the employee stock ownership and retirement plans are criticized because the incentive purpose is almost null in the short run and carry a high degree of risk in the long run. To conclude, the author suggests there is evidence that the regulatory standards were poorly conceived and some concepts as directors' independence need an adjustment. To complete the previous stated idea, John C. Coffee Jr (2003) highlights the problem of the market deregulation in the 1990's confronted with the evidence in the early 2000's, and the problem of the executive increasing compensation at the same time as the decreasing CEO tenure, which led to the attempt of inflating earnings in the short run and overvaluation the companies' stock prices.

## 2.2 Taxonomy System

In 1999, with the purpose of solving the problem of lack of a clear framework, Weimer & Pape published the study "A Taxonomy of Systems of Corporate Governance"[1], classifying the industrialized countries in four groups: the Anglo-Saxon, Germanic, Latin and Japan system; which is based upon eight characteristics: the prevailing concept of the firm, the board system, the salient stakeholders able to exert influence on managerial decision-making, the importance of stock markets in the national economy, the presence or absence of an external market for corporate control, the ownership structure, the extent to which executive compensation is dependent on corporate performance, and the time

[1] See Table 2, Appendix 1, for a summary of the taxonomy of the systems.

horizon of economic relationships. The particular model adopted by the companies in Germany is the Germanic model along with other countries as Netherlands. This model states the firm is an autonomous economic entity which is constituted by a variety of members (stakeholders), such as "shareholders, corporate management, employees, suppliers of goods and services, suppliers of debt and customers, striving for the continuity of the firm as a whole" (Moerland, 1995a). La Porta (1999) found empirical results that companies with the Anglo-Saxon model are widely dispersed in constrast with German model companies that have the characteristic of high ownership concentration. The model has a Two-tier board system, with a management board ("Vorstand") and supervisory board ("Aufsichtsrat") providing a separation between management and supervision and the managers being appointed and dismissed by the supervisory board. The supervisory board composition reflects that employees and shareholders, along with industrial banks are salient stakeholders on the decision-making process. Stock markets play a small role in Germanic countries and "an active external market for corporate control is almost nonexistent". The high concentration of ownership helps to have more mechanisms to influence managerial decision-making, while shareholder indentify helps to explain the network orientation on these countries with no need of a market for corporate control. Performance-based executive compensation is limited but is becoming more important. Finally, in Germany the stable shareholdings by banks or nonfinancial corporations as the influence of employees allow for stable and long economic relationships (Gelauff and Den Broeder, 1996).

## 2.3 Law and Regulations

To complete this literature review we covered the legislation of the country and the *OECD Principles of Corporate Governance* and came up with a brief analysis of the law and

regulation on companies' governance, in order to understand what the state of art in Germany is. The Government Commission published the latest version of the *German Corporate Governance Code* on May of 2013 presenting some essential statutory regulations for good governance and states the obligations of the management and supervisory boards to ensure the sustainability and the creation of value for their company (see the evolution of regulations in Appendix 1, table 3). The code is targeted for all listed companies in the German stock exchange but is recommended for all other non-listed companies to follow it. A dual board system (two tired) is prescribed by law. The management board is comprised by executive members only, being responsible for independently manage the company and has a Chairman responsible for the coordination of their work. In the general meeting, the shareholders elect the members of the Supervisory Board which is responsible to appoint, supervise and advise the Management Board, it is also coordinated by its Chairman. Companies with more than 500 or 2000 employees in Germany should also be represented in the Supervisory Board, having 1/3 or 1/2 of the representatives respectively. In the last case and in the hypothesis of split in a decision to be made by the Supervisory Board, its Chairman has the casting vote. There are two types of proposals in the Code: the "recommendations" of which companies can deviate from if, disclosure it and justify the deviation (from here further stated as "comply or explain"), in order for the companies to reflect sector-specific requirements but all deviations from the code recommendations must be in the interest of transparency and good corporate governance; and the "suggestions" of which there is no need to disclosure any deviation from them.

Among the recommendations the most important in general and specifically to this study are:

The code suggests that every share is equal (using the principle one share, one vote), without multiple voting rights or preferential voting rights. Voting cap is also not used (see point 2.1.2). The Supervisory Board shall meet the number of times its Chairman finds appropriate and the meetings shall be attended by shareholders representatives and employee representatives and, if necessary, by the members of the Management Board (see points 3.2 and 3.6).The composition of the Boards somehow neglected by the code, simply aiming towards diversity, specifying the importance of women to be present but without stipulating a minimum number of females (see points 4.1.5 and 5.1.2). Similarly to point that can be considered very liberal which is 5.4.2 stating "The Supervisory Board shall include what it considers an adequate number of independent members." what allows the companies to have a number of independent members not disclosed in their reports and investors don't have access to that information since, very often, the companies only state there is an adequate number of independent members in the Supervisory Board. Finally, an age limit shall be specified in the company reports but there is no indication to a global limit for all companies mandated by the code. Relatively to compensation of the Boards it is very alike for the two of them, stating the mandatory conditions of stating individually performance and non-performance compensations, cash or other types (see points 4.2.2, 4.2.3 and 5.4.6). Accordingly to the point "5.3 Formation of Committees" the Supervisory Board shall form committees depending on the number of members and the specifics of the enterprise. The code recommends the companies to form at least an Audit and a Nomination committee amongst others the Supervisory board think it's necessary.

Regarding mandatory disclosures, the code clearly states that whenever a threshold (3, 5, 10, 15, 20, 25, 30, 50 or 75 % of the voting rights in the company) is exceeded or falls below by a single entity (person or company), the Management Board is responsible for disclosing the fact on the date (see point 6.2 of the code). If the members of the

Management Board and Supervisory Board together, directly or indirectly, hold more than 1% of the shares issued by the company, this shall be reported individually for all members in the annual report (see point 6.6 of the Code).

## 3. Data Description

After the review of the existing literature, and in order to perform an empirical analysis, I need to proceed by indentifying three points.

First I need to identify about what companies to select as the focus of this study, to do that I chose an index based on two criteria points: the importance of the index in the stock market and economy of the country and the extent of the index. The chosen index was HDAX, since it covers the majority of the market capitalization listed in Germany, which allows having a wider perspective of the market, and it is comprised by the 110 biggest listed companies in Germany, which is a sufficiently large sample to obtain a robust econometric analysis. Second, the decision about what type of format of the data led to the balanced panel data in order to avoid problems of model specification and some statistical tests to be run. Third, the time period thought to be adequate to perform a robust analysis and enough to dilute the effect of the financial crisis in 2008.

Therefore I acknowledge what companies were present in the index in every year from 2005 until 2012 and included them; the ones not present in the index at least in one of the years were excluded from the sample.

With the sample being balanced, other adjustments were made. We followed the approach of some authors and excluded financial companies such as banks and insurance companies from the sample. As Rajan & Zingales (1995) said, this type of companies' "leverage is strongly influenced by explicit (or implicit) investor insurance schemes such as deposit

insurance. Furthermore, their debt-like liabilities are not strictly comparable to the debt issued by nonfinancial firms. Finally, regulations such as minimum capital requirements may directly affect capital structure", also Fama & French (2002) argued "*Excluding financials and utilities may also go a long way toward alleviating any omitted variable problems*". The next step was to eliminate companies with headquarters outside Germany – which don't have to comply with the German CG code – since the majority of important non-financial information is not disclosed, such as shareholder structure and individual remuneration. With all adjustments made, our sample is comprised to a total of 61 companies along eight years, with 53 indicators (possible variables), of which I expect 9 of them to be dependent variables and 44 independent variables, obviously this is not the final sample because it has excessive variables and it suffered a process of elimination explained later in the methodology (See Appendix 2, Table 4 and 5). The data used in this sample construction was obtained in the consolidated financial statements, which according to previous researches have superior value relevance in relation with Company Parent ones (i.e. individual accounts). In addition, Jyrki Niskanen et al (1994) stated "Consolidated earnings are informative because they reflect the economic performance of the entire economic entity where investors hold their equity claims" and their study provide evidence that consolidated earnings are a significant incremental explanatory variable while individual accounts are not. Apart from annual reports, information about the market obtained from Thomson Reuters database was used.

# 4. Variables and Hypotheses

## 4.1 Measuring Performance

In corporate governance studies, as in any other study dealing with performance there are some measures generally accepted amongst authors: productivity, valuation, profitability,

growth; are all measures of firm performance, each of them more related to the specification of the companies and sector they are in, also to the companies objectives.

1. Return on equity (ROE)

Brown and Caylor (2004) used in their study, among others, return on equity as performance measure, they based their choice arguing it captures corporate governance mechanisms, which reduces the control rights managers exert on companies, being obligated to pursue investments with higher value which is reflected in operating performance, they followed other authors such as Shleifer & Vishny (1997).

Another authors also use ROE when measuring performance and relating it with governance practices, such as Donaldson & Davis (1991) and Damodaran (2007) who states "the return on equity focuses on just the equity component of the investment."

2. Return on assets (ROA)

Following the thought of Barber & Lyon (1996) and Bhagat & Bolton (2009), with the last considering ROA as their primary measure of firm operating performance, I decided to use the same variable, since the return on assets ratio can show how profitable a company's assets are in generating revenue and "also has more desirable distributional properties than the return on equity measure" (Core et al, 2006. pp. 666-667). According to Core *et al* (2006), "to the extent that governance affects firm performance through capital expenditure programs**,** depreciation expense is an important component of a firm's performance".

3. Tobin's Q

As a financial firm performance measure Tobin's q is the chosen variable in this study, in order to relate the market value of a company and the replacement value of the firm's

assets. In 1968 James Tobin, Nobel in economics, came up with a new hypothesis that the combined market value of all the companies on the stock market would be equal to the replacement costs of their assets (Tobin & Brainard 1968). In 1981 Lindenberg & Ross (1981) introduce the Tobin's Q ratio in their paper using the same ratio proposed by Tobin. Morck, Shleifer & Vishny (1988) "investigate the relationship between management ownership and market valuation of the firm, as measured by Tobin's Q". Finally, and being the approach used in this study, Kaplan & Zingales (1997) came up with a different way of calculating Tobin's Q, which was generally accepted and followed by most authors since then, such as Gompers, Ishii, & Metrick (2003) and more recently Bhagat & Bolton (2008). Following their approach, this study measures Tobin's Q as the market value of assets divided by the book value of assets (Appendix 2, Table 6).

## 4.2 Explanatory Variables

In the empirical analysis of the study I will try to find and explain the relationship of the chosen independent governance variables and the performance variables.

**Board Size.** In this study Board size is a scale measure (1… n), this variable is on the group of board of directors' composition, which include some of the most important variables in governance to explain performance. Some authors affirm board size is related to firm performance as Jensen (1993), arguing small boards "can help improve their performance" and Raheja (2005) stating the optimal board size is dependent on the firm characteristics. Even empirical studies on board size reveal a link with performance (Anderson et al., 2004).

**Board Independence.** The independence of corporate boards has received much attention in recent research, with the term "independent" having different concepts: "What constitutes an "independent director" follows from definitions in leading codes of best

practice." Johanson & Ostergren (2010), with different definitions across countries. Summarizing, Bhagat & Black (1998) state there is "evidence, on the relationship between board independence and firm behavior and performance. The variable is defined as a percentage according to Bhagat & Bolton (2008), "The number of independent directors divided by the total number of board members", being this definition the one I chose.

**Employee Representation.** The presence of representatives of employees on the board "proxies the ability of nonexecutive employees to influence decision making within a firm's board of directors" (Guedri & Hollandts, 2008). Board employee representation varies widely across countries, in some countries, like USA there is absolutely no representation of employees in the board, whereas Germany has very high, legally mandated, levels of representation. There is still some countries, like France, in-between the others with both mandatory and chosen representation. Board employee representation is accounted here with a ratio between the number of directors representing employees and the total number of directors sitting on a firm's board.

**Percentage of Female Board Members.** Shrader et al (1997) investigate the relationship between the percentage of female board members and two accounting measures of financial value (ROA and ROE) and found interesting evidence. Adams & Ferreira (2009) and Carter, Simkins, & Simpson (2003) also study the presence of females on the board of directors, (which decided to use it as a dummy variable). In this study it is a used as a percentage.

**Supervisory Board Variable Remuneration.** In the AFEP/MEDEF corporate governance code of good practices is enhanced the importance of boards variable compensation and what it should consider to its calculation.

*It should take account, in such ways as it shall determine, of the directors' attendance at meetings of the Board and committees, and therefore include a variable portion. It seems natural that the directors' attendance at meetings of specialized committees should be rewarded with an additional amount of directors' fees.* Corporate Governance code of listed corporations (June 2013), pp. 19.

**Age of CEO.** Hambrick & Mason (1984) argue that: *The association between the age of top executives and organizational characteristics has not been the subject of many studies, but the few that exist yield strikingly consistent results: managerial youth appears to be associated with corporate growth (Child, 1974, Hart & Mellons, 1970) (…) A related finding of these studies is that volatility of sales and earnings also is associated with managerial youth. So, what emerges is a picture of youthful managers attempting the novel, the unprecedented, taking risks.* Hambrick & Mason (1984), pp. 198.

We will see if it is related to other performance measures besides company growth.

**Type of Ownership.** This is a categorical variable with the type of owner of the corporation. Following La Porta et al. (1999), "To describe control of companies, we generally look for all shareholders who control over 10 percent of the votes. The cutoff of 10 percent is used because (1) it provides a significant threshold of votes".[2]

**Board Ownership.** The variable is accounted as the mean value (in euros) of common stocks owned by directors. Bhagat & Bolton (2009) focus on the "dollar value rather than percentage of ownership because it serves as a more direct measure of incentives to the director."

[2] The different types of owners are described in Table 3, Appendix 2.

**Shareholder Concentration.** Guedri & Hollandts (2008) define a variable of "ownership concentration captured by the percentage of stock held by the largest shareholder", following McConnell & Servaes (1990)."

### 4.3 Control Variables

Along with the explanatory variables, other variables were introduced in order to control some undesired effects of the data, the companies' structure and market conditions. The control variables present in the model are Net Assets and Firm Size. Firm size is a very important variable because of its risk-neutral effect on corporate ownership that is used for most firm-level studies because of its risk-neutral effect on corporate ownership (Demsetz & Lehn, 1985). Economies of scale and scope are present in large companies, which impacts on firm performance. The logarithm of the book value of total assets is the most used in this topic; many authors, such as Thomsen and Pedersen (1996), Renneboog (2000), Anderson and Reeb (2003), and Bauer et al. (2004) use this variable as a proxy for firm size.

## 5. Hypotheses

The problems between governance and performance cannot be fully explained nor solved but there are some empirical studies and respective propositions that affirm some practices can help to do so[3]. Table 7, Appendix 2, shows the summary of the Hypotheses.

The number of board members is often more than the optimal to perform effectively, reaching a point where firm value is decreased, according to Jensen (1993), which I chose to test since it has the more studies supporting it. In line with previous studies, such as Yermack (1996), Bhagat and Black (2002), the hypothesis bellow have the purpose of

[3] In every hypothesis when stating 'firm performance' it is referring to ROE, ROA and Tobin's Q. All tests were performed for each dependent variable separately.

testing the relationship between the board size and proxy measures of firm performance. Nevertheless some authors affirm board size affects positively the performance (Adams & Mehran, 2005; Jay Dahya et al, 2007; Cole *et al*, 2007).

*Hypothesis 1: The size of the board of directors is negatively related to performance.*

Independent board members (or board outsiders) are expected to give an outside view and more active monitoring of the board decisions (Jensen and Fama, 1983) and lead to higher rate of replacement of management when performance is poor (Renneboog, 2000). By contrast many authors found a negative relation between independence and firm performance, as Bhagat & Black (2002) and Bhagat and Bolton (2008) attributing it to the wider separation of ownership and control. Although there are different opinions I understand that Board Independence is crucial to firm performance, going in line with Internacional guidelines of OECD.

*Hypothesis 2: Board independence increases firm performance.*

Recently, companies have been giving more importance to the presence of women in corporate boards. Carter, Simkins, & Simpson (2003) found positive relationships between the fraction of women on the board and firm value. According to a study of Borisova (2012) companies with highest percent of women in top management, within each industry, have a ROE 41% higher than firms without women on top management. (Borisova & Sterkhova, 2012).

*Hypothesis 3: The percentage of women in the board has a positive effect on firm's financial performance.*

Guedri & Hollandts (2008) define: "the inflection point in the inverted U-shaped relationship will occur at lower levels of employee stock ownership in the case of employee board representation than otherwise. Indeed, the magnitude of the negative force

generated by managerial entrenchment and employee participation in strategic decision making is further amplified if employees are represented on the board of directors by a nonexecutive employee". The author hypothesizes the presence of employee representation level impacts on the relationship between employee stock ownership and performance. Considering the view of the author, this study proposes a related, yet different, approach to the hypothesis, in order to explore this relationship and somehow innovate.

*Hypothesis 4: Employee board representation level has a positive on impact firm's performance.*

The empirical corporate governance literature offers no unequivocal answer to the costs and benefits of concentrated ownership. Some scholars have found benefits to performance (La Porta et al, 1999), while others found negative effects (Loderer and Martin, 1997; Demsetz & Lehn, 1985). Considering the arguments in favour and against ownership concentration as well as previous findings I found the arguments in favour are stronger and more consistent, therefore this study proposes the following:

*Hypothesis 5: Firm's performance are positively affected by ownership concentration.*

The approach here was to use the classification of La Porta et al. (1999):

*To describe control of companies, we generally look for all shareholders who control over 10 percent of the votes. The cutoffs of 10 percent is used because it provides a significant threshold of votes; and most countries mandate disclosure of 10 percent, and usually even lower, ownership stakes.* La Porta et al (1999), pp 8.

Following the information on Weimer & Pape (1999), whom state in Germanic models banks often have equity ownership, supervisory boards seats and voting rights, the hypothesis was formulated.

*Hypothesis 6: Performance indicators are positively affected is companies are held by financial institutions.*

The association between the age of top executives and organizational characteristics has not been the subject of many studies, but the few researches about the subject present consistent results: managerial youth appears to be associated with corporate growth but also with volatility of sales and earnings (Child, 1974; Hart & Mellons, 1970). So, what emerges is a picture of youthful managers attempting the novel, the unprecedented, taking risks. Following the literature but using different performance dependent variables, this study hypothesizes the following:

*Hypothesis 7: Firm's performance is positively affected by younger CEOs.*

The relationship between stock ownership of top management and corporate performance has been deeply studied by economists. Findings have been mixed, but the costs and benefits are unequivocally defined. Inquiry into the issue has been prompted largely by the Berle and Means (1932) thesis that owners have a greater stake in the firm than do non-owners and so will engage in more purely income-seeking behaviour. Some scholars have found a positive association with corporate performance (La Porta et al, 2000) and others negative association (Loderer and Martin, 1997). With the available evidence about stock ownership, and accepting the propose of La Porta which I think is the more accurate, I came to the following proposition:

*Hypothesis 8: There is a positive relationship between stock ownership of board members concentration and Tobin's Q.*

Because of bonuses and other incentive compensation plans, managers' income often varies with corporate performance (Lewellyn, 1969; Lewellyn & Huntsman, 1970; Hambrick & Mason, 1984), while they also run the risk of being fired if firm performance

falls off a risk that owner-managers do not face (James & Soref, 1981; Salancik & Pfeffer, 1980). Previous studies focused on managers variable remuneration, but since in Germany the two tiered system is mandatory, we decided to study this relationship but using the variable remuneration in supervisory board, to have a new perspective.

*Hypothesis 9: There is a positive relationship between Supervisory Board variable remuneration and firm's performance.*

# 6. Methodology

All the aspects of governance and performance were discussed, allowing me to proceed with an empirical investigation. In this section I'll describe the process from the finish of the database creation until the final statistical model conception that will allow the empirical analysis and interpretation of the results.

After creating the database there were too many variables to study, 53 indicators (possible variables), of which 9 expected to be dependent variables and 44 independent variables and most probably would cause a lot of problems to the model, therefore we had to filter it to separate the relevant from the irrelevant variables. The final variables, dependent and explanatory, were chosen, without exception, basing the decision on the existing literature emphasizing the studied theories, following, in part, the criteria proposed by Studenmund (2000), the irrelevant variables in explaining the dependent variables in analysis were removed. This process was carried out until reaching the final variables for this study. To understand if the OLS estimator is BLUE (Gauss Markov Theorem), under assumptions MLR.1 to MLR.5, some tests were performed.[4] [5]

[4] All tests were performed individually for each dependent variable equation with all the independent variables.
[5] Variables that violates MLR.3 (No Perfect Collinearity) were removed, using the software STATA tools.

First, I need to test the RE against the FE estimator in order to see which type of endogeneity is present and which estimator better fit the data. So a Hausman test, which tests if the unique errors ($u_i$) are correlated with the regressors (MLR. 4), was performed with the null hypothesis of the difference in coefficients not being systematic in order to choose between the Fixed Effects estimator and the Random effects estimator. Since the previous test did not reject the null hypothesis for the equations of ROE and ROA as dependent variables (see Table 8, Appendix 3), I cannot conclude FE is better fitted model, although the equation with Tobin's Q rejected the null, hence I should use FE. Then I ran a Breusch-Pagan Lagrange Multiplier test to decide between a Random effects regression and a simple OLS regression for the first two equations. With this test is possible to see if there is evidence of significant difference across units (panel effect), which will inform if the random effects is appropriate for the data. After that, and since the previous test rejected the null hypothesis of variances across entities being zero for both equations (see Table 9, Appendix 3), I could decide which estimator to use in each equation (with the different dependent variables), and more tests were conducted.

Using the Breusch-Pagan LM test for independence (B-P/LM), with the null hypothesis of residuals across entities not being correlated, I found if contemporaneous correlation is present in the data, in other words if error across sections are dependent[6]. Using the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity, with the null hypothesis of constant variance (i.e. homoskedasticity), allows me to conclude if the assumption MLR.5 (Homoskedasticity) is violated (Table 10, Appendix 3). Then following Wooldridge (2002), I tested the null hypothesis of no first order correlation (AR (1)). (See Table 11, Appendix 3)

[6] Since the test gave an error, results didn't provided results, and we cannot reject the null hypothesis. The errors across sections were assumed to be independent.

Finally, after performing all tests, I ran the adequate model to correct the problems present in the data. The chosen model is the Random effects (for equation 1 and 2) and Fixed effects estimator (for equation 3) with clustered data. When computing the standard errors and the variance-covariance estimates, using the fixed/random effects robust cluster estimator, it assumes the disturbances are, by default, heteroskedastic and present autocorrelation (see Table 13, Appendix 4). With this model the problems of heteroskedasticity and autocorrelation of type AR (1) are solved, also decreasing the standard errors and the model is better specified providing better analysis. The general form for the regressions are:

$$\begin{aligned}\text{ROE} = {} & \beta_0 + \beta_1 \text{Board Size} + \beta_2 \text{Board Independence} + \beta_3 \text{Employee Representation} + \beta_4 \text{Female Percentage} + \\ & \beta_5 \text{ Supervisory Board Variable Remuneration} + \beta_6 \text{Age of CEO} + \beta_7 \text{Board Ownership} + \\ & \beta_8 \text{Shareholder Concentration} + \beta_9 \text{Net Assets} + \beta_{10} \text{Firm Size} + \beta_{11} \text{Widely held} + \beta_{12} \text{Family} + \\ & \beta_{13} \text{State} + \beta_{14} \text{ Non Financial Institution} + \beta_{15} \text{Financial Institution} + \beta_{16} \text{Cross Holding} \end{aligned} \quad (1)$$

$$\begin{aligned}\text{ROA} = {} & \beta_0 + \beta_1 \text{Board Size} + \beta_2 \text{Board Independence} + \beta_3 \text{Employee Representation} + \beta_4 \text{Female Percentage} + \\ & \beta_5 \text{ Supervisory Board Variable Remuneration} + \beta_6 \text{Age of CEO} + \beta_7 \text{Board Ownership} + \\ & \beta_8 \text{Shareholder Concentration} + \beta_9 \text{Net Assets} + \beta_{10} \text{Firm Size} + \beta_{11} \text{Widely held} + \beta_{12} \text{Family} + \\ & \beta_{13} \text{State} + \beta_{14} \text{ Non Financial Institution} + \beta_{15} \text{Financial Institution} + \beta_{16} \text{Cross Holding} \end{aligned} \quad (2)$$

$$\begin{aligned}TobinsQ = {} & \beta_0 + \beta_1 \text{Board Size} + \beta_2 \text{Board Independence} + \beta_3 \text{Employee Representation} + \\ & \beta_4 \text{Female Percentage} + \beta_5 \text{ Supervisory Board Variable Remuneration} + \beta_6 \text{Age of CEO} + \\ & \beta_7 \text{Board Ownership} + \beta_8 \text{Shareholder Concentration} + \beta_9 \text{Net Assets} + \beta_{10} \text{Firm Size} + \\ & \beta_{11} \text{Widely held} + \beta_{12} \text{Family} + \beta_{13} \text{State} + \beta_{14} \text{ Non Financial Institution} + \beta_{15} \text{Financial Institution} + \\ & \beta_{16} \text{Cross Holding} \end{aligned} \quad (3)$$

# 7. Results

Table 12, Appendix 4, presents descriptive statistics for the entire sample. It presents a great variance on the independent percentage of directors (0,14-0,91) which shows the freedom the code gives in this subject. It also shows the mean value of female board members (6 per cent) which is not very high, although it had been increasing in the last years. Also, rejecting Weimer & Pape (1999), companies held by financial institutions is only the third larger type. Finally the median values of CEO age, shareholder concentration and board ownership are behind (and far) from their average, indicating a lot of low values and few, but really high observations.

Table 14 and Table 15, Appendix 4, summarizes the results on the models from the OLS, FE/RE effects. In Table 16, Appendix 4, I report the results for the relationship between return on equity (ROE, Model 1), operating performance (ROA, Model 2), Tobin's Q (Model 3), and the governance measures respectively. Given that the data relates to 61 firms over eight years (2005–2012), I employed the Fixed and Random effects estimators, corrected for any latent heteroskedasticity and serial autocorrelation. Multicollinear variables were omitted from the model. Tests for heteroskedasticity and autocorrelation showed evidence of their presence (Appendix 3, Table 10 and Table 11). For every dependent variable I estimated three models; first the regular Ordinary Least Squares (OLS), second a regular FE/RE and finally the FE/RE with clustered data (results from all models are present in tables X,Y,Z). Model 1 and Model 2 present very similar results, therefore their analysis will be combined, and on the other hand, Model 3 has very particular outcomes, so it has a different analysis. Board size is a variable with ambiguous results, having positive coefficient in Model 2 but negative with Model 1, although they are very close to zero, in addition it is not statistically significant, therefore we cannot

corroborate our hypothesis. Board independence and percentage of female board members, all have negative coefficients, both in Model 1 and in Model 2. Although they are not statistically significant, their coefficient signs agree to hypotheses 2 and go against hypotheses 3 and 5. Board Ownership has negative coefficient in both Model 1 and 2, and are significant at 5% level, against my hypothesis 8, showing boards detaining stock don't mean better performance, and that members of the board being somehow 'owners' of the company could arise problems. At a 5% level in Model 1 and 2, the results regarding Employee Representation agrees to my proposition 4, associating higher levels of representation of employees in the board with better performance of the firm (Model 1: $\beta$=0,101, $p<0,05$; Model 2: $\beta$=0,055; $p<0,05$). Although results are close zero (the conclusions are not strongly consistent), the coefficients of the Supervisory Board Variable Remuneration in both models are positive and significant at 1% for Models 1 and 2, corroborating the proposition in this study (Model 1: $\beta$=7,02E-05; Model 2: $\beta$=9,07E-04). With significance at 5% (Model 2) and 1% (Model 1) levels and positive coefficients (Model 1: $\beta$=0,004; Model 2: $\beta$=0,002), these findings confirm some authors who argue elder CEOs provide better and more stable performance, probably through their aversion to risk and bolder approaches and their preference for more consistent strategies and less aggressive decisions. These results, however, reject the hypothesis tested in this research and the opinion of Child (1974). The concentration of the shareholdings in the company just offer significant evidence to its performance in Model 1, besides that it has positive coefficients which is in agreement to some authors (La Porta et al, 2000; Jensen & Meckling, 1976; Demsetz & Lehn, 1985) and the research hypothesis. Finally, the categorical variable Type of Ownership led to some interesting findings; both in Model 1 and 2, companies held by the state happened to have the strongest and sharpest relationship with firm's performance (Model 1: $\beta$=0,255; Model 2: $\beta$=0,091), although the

number of companies is relatively small which may lead to less robust results, while companies held by non-financial institutions present the less strong relationship with performance Model 1: β=0,130; Model 2: β=0,039).

For Model 3 the results were quite different, actually the majority of the variables doesn't show evidence to explain the performance measures. Board size, Board independence, Percentage of female board members, Supervisory Board Variable Remuneration, Age of CEO and Board Ownership are not statistically significant, and cannot help to prove the hypotheses studied, besides the fact that some coefficients agree to the predicted impact in performance. In terms of the Employee representation and its repercussion to performance, it confirms the previous findings from Model 1 and 2, showing the strong and positive relationship between representation and firm's performance (significant at 1% level). Like the Model 1, Model 3 reveals a significant and positive relation between shareholder concentration and contemporaneous performance, i.e., higher values for Tobin's Q. These findings corroborate my hypothesis that companies with higher levels of concentration (in terms of the largest shareholder) will improve firm's performance. Finally the Type of ownership is not significant unlike the results of the other two models.

# 8. Conclusions

The main objective of this research was to explore the impact of some corporate governance variables and decisions on the measures of firms' performance. My findings on this research suggest this relationship direction and extent depends upon the performance indicator considered. More specifically, I found the variable age of the CEO is only significant in explaining return on equity and return on assets, whiles it suggests there is no relationship with market based performance indicators (Tobin's Q). This relationship is not in line with previous research, going against Child (1974), which

suggests managerial youth is associated with corporate growth. The only governance variable with significance and positive impact in all three performance measures is the employee representation on the board of directors (although supervisory board variable remuneration), and its impact on Tobin's Q was relatively larger in comparison to the other measures. This measure proxies the ability of non-executive employees to influence decision making within a firm's board of directors and to establish alliances with executive directors. These results corroborate my hypothesis that the presence of directors appointed by employees balance corporate policies resulting in better decisions by the board, allowing the company to pursue shareholder value but taking into consideration other stakeholders. It is interesting to see that companies held by the state present better performance indices than the other types of companies, it is even more interesting if we look at the number of companies (only 32 observations along the 8 years in the sample), when relating to ROE and ROA. Only concerning to Tobin's Q, companies held by Financial Institutions present better results than the others, accepting my hypothesis and going towards the tendency in Germany of Banks being salient stockholders and stakeholders (Weimer and Pope (1999); La Porta et al (1999)), probably because it is a market measure of performance, it has a greater role in the performance of companies shares. Shareholder concentration has been much debated with contrary opinions about its influence in firm's performance, my results showed evidence of positive impact on performance, supporting the idea that minority investors ride less freely and there is more effective monitoring of managers (although it had a negative (close to zero) result relating to ROA, which shows the mixed opinions are also met in this study and one cannot be take a definitive conclusion). A surprising result was the fact that Board Size and Board Independence did not provide statistically significant results, failing to support hypotheses subject of many researches.

This research provides important theoretical and practical implications. First it confirms the importance of the companies to look out of the pursuit of shareholder value and stockholders interest only, and reach further to understand all stakeholders. More specifically, it provided evidence that employee representation in the board of the companies will result in better operational and market performance, which can extent to other stakeholders, with the rationale that giving employees a voice in corporate governance likely to boost firm performance, which support the system in Germany that mandates well defined minimum levels for it, being. Moreover, previous literature didn't give much emphasis to this topic, but given this is a characteristic of the German Model only, this could be implemented in other countries at least in some industries where employees have more power, in order to produce better negotiations and provide more stability to companies (Ziegler (2000), provides a better explanation of these industries). This study also refuted some authors who argue managerial youth is better for companies' performance than the experience, consistency and robustness older CEOs provide. At the same level it has deepened the research about the goals that define the variable remuneration, especially considering only the supervisory board and showing it could play an important role on directors' decisions about the company. Since it is a specific characteristic of the Germanic governance system, it implies fewer studies about the subject.

Second, I tested my hypotheses using a sample of firms comprising the HDAX listed on the Frankfurt stock exchange. This is a distinction from the majority of governance studies, based on US samples. Using this data sample allowed me to account, not only for the biggest quoted companies in Germany (DAX 30), covering close to 85% of the listed market capitalization, but also to have an extent of observations sufficiently robust to test.

This study has some limitations, which provide opportunity for future research. First, some of our variables probably don't have a direct linear relationship with firm's performance as the employee representation, in which extreme levels can lead to exertion of their influence to maximize their own interests, and disregard shareholder value maximization. The same thing could happen with variable remuneration, since directors' opinions can be motivated by pre-defined goals to achieve that remuneration. Therefore one aspect to improve for future research is to find an inverted U-shaped relationship between these variables and performance measures, in order to understand the limits to increase performance until the reach of the optimal level.

Second, this research don't have enough companies to confirm the different results on performance by differently held companies, more specifically companies held by the state had interesting results and should be studied with a higher number of state held companies in relation to state non-held companies.

Third, the data sample only comprises German companies; future research should investigate these relationships in other countries exhibiting other institutional contexts in order to increase the external validity of findings reported in this study.

Fourth, all the conclusions on the study have to be relativized and put in context, taking into account the size and type (only listed companies) of the sample and the timeframe, because the conclusions we take can only be accepted to my database, in this eight years, and cannot be extrapolated.

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# Appendix 1.

| Theory | Authors and Articles | Summary |
|---|---|---|
| **Economic Foundations** | Smith, A. (1776). An Inquiry into the Nature and Causes of the Wealth of Nations | Necessity of multiple shareholders in the firm. Recognition of the conflict between managers and shareholders. |
| | Chandler, A. (1997). The Visible Hand: The Managerial Revolution in American Business | |
| **Agency Theory** | Berle, A. & Means, G.C. (1932). The modern corporation and private property | Discussion of the separation of ownership and control. Definition of the principal-agent relationship: "a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf"; and agency costs: monitoring and bonding expenses and the residual loss. Identification of mechanisms to control the agency costs. Definition of the concept of the firm: a set of contracts among individual production factors. Separation of the three major functions of agents, the decision making, the decision control and the residual risk bearing. |
| | Berle, A. (1965). The impact of the corporation on classical economic theory | |
| | Jensen, M.C. & Meckling, W.H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure | |
| | Fama, E.F. (1980). Agency Problems and the Theory of the Firm | |
| | Fama, E.F. & Jensen, M.C. (1983). Separation of Ownership and Control Separation of Ownership and Control | |
| | Jensen, M.C. (1984). Takeovers: Folklore and science | |
| | Eisenhardt, K. (1989). Agency theory: An assessment and review. Academy of management review | |
| | Learmount, S. (2002). Theorizing Corporate Governance: New Organizational Alternatives | |
| | Daily, C., Dalton, D. & Cannella, A. (2003). Corporate governance: Decades of dialogue and data | |
| **Stewardship Theory** | Donaldson, L. & Davis, J. (1991). Stewardship theory or agency theory: CEO governance and shareholder returns | Disagreement of the self-interested manager concept. Define managers as stewards, who react to intrinsic rewards instead of the self-interested utility maximizer and seek organizational goals. |
| | Davis, J., Schoorman, F. & Donaldson, L. (1997). Toward a stewardship theory of management | |
| **Managerial Hegemony** | Mace (1971) | Directors are dispensable in the company. Support of the managers' role on the every day decisions. |
| | Lorsh, Jay W. and Maclver (1989) | |
| **Upper Echeons Theory** | Hambrick, D.C. & Mason, P.A. (1984). Upper Echelons: The Organization as a Reflection of Its Top Managers | Organizational outcomes are related to the charateristics of its top managers, more specifically their roots and background. |
| | Hambrick, D.C. (2007). Upper Echelons Theory: An Update | |
| **External Pressures** | Lawrence, P. & Lorsch, J. (1967). Differentiation and integration in | Highlights the importante of the directors in creating links and improving the relations with external forces. Definition of network oriented systems |
| | Pfeffer, J. (1972). Size and composition of corporate boards of directors: The organization and its environment | |
| | Jones, C., Hesterly, W.S. & Borgatti, S.P. (1997). A General Theory of Network Governance: Exchange Conditions and Social Mechanisms | |
| | Hillman, A., Cannella, A.A. & Paetzold, R.L. (2000). The resource | |
| **Stakeholder Theory** | Freeman and Reed (1983) | Against the tendency that only stockholders matter, defending the view of maximizing the utility for all stakeholders not only the shareholders. |
| | Blair, M.M. (1996). Ownership and Control: Rethinking Corporate Ownership for the Governance Century | |
| | Freeman (1993) | |
| | Clarke, T. (1998). The stakeholder corporation: A business philosophy for the information age | |
| | Pest et al (2003). | |
| **Convergence Theory** | Useem, M. (1998). Corporate leadership in a globalizing equity market | Defend a trend that all governance models are converging to the Anglo-Saxon model. |
| | Rhodes, M. & Apeldoorn, B. Van (1998). Capital unbound? The transformation of European corporate governance | |
| | Guillen, M. (1999). Corporate governance and globalization: arguments and evidence against convergence | |
| | Nestor, S. & Thompson, J. (2000). Corporate governance patterns in OECD economies: Is convergence under way? In: Corporate governance in Asia: A comparative perspective | |

**Table 1. Theories Summary**

| Characteristic/Model | Anglo-Saxon | Germanic | Latin | Japan |
|---|---|---|---|---|
| **Concept of the firm** | Instrumental | Institutional | Institutional | Institutional |
| **Board System** | One-Tier (executive and non-executive board) | Two-Tier (management board and supervisory board) | One-Tier or Two-Tier (no distinction between executives and non-executives) | Board of directors (inside), representative directors, office of auditors (outside) |
| **Salient Stakeholders** | Shareholders | Industrial Banks, employees | Financial holdings, government, founder families | Financial institutions, employees |
| **Importance of stock market in the national economy** | Great importance, used to raise capital by companies | Small importance | Small importance | Great importance |
| **Active external market control** | Takeover processes are common | Pratically non-existant | Don't exist because is forbidden by regulation | Don't exist |
| **Ownership concentration** | Small (Widely dispersed) | High (Mostly banks) | High | Moderate/High (Family owned) |
| **Performance-dependent executive compensation** | This compensation system is very usual | Is not common but is increasing | Is not usual | There is no necessity |
| **Time horizon of economic relationships** | Short-term relationships because of the unrestricted market | Long-term and stable economic relationships | Long-term and stable economic relationships | Long-term and stable economic relationships |

**Table 2. Governance Systems Taxonomy**

Retrieved from: Weimer, J., & Pape, J. (1999). A Taxonomy of Systems of Corporate Governance.

| Year | Code | Description |
|---|---|---|
| 1861 | General Commercial Code for all of Germany | Companies should be constituted with a single board of directors, although they had the option of a two-tier board system. |
| 1884 | General Commercial Code for all of Germany | Compliance with a two-tier board system.<br>The members of the supervisory board were not allowed to serve on the management board.<br>Shareholders could still directly elect management board members |
| 1951 | | First appearence of employees' representatives in the Supervisory Board in some industries. |
| 1994 | | Prohibition of insider trading. |
| 1995 | | Establishment of the Federal Securities Supervisory Office.<br>Mandatory disclosure of voting rights percentages of major shareholders. |
| 1998 | First law in Germany regarding Corporate Governance | Extension of the roles of supervisory board, executive board and auditors.<br>Mandatory publishing of the risk structure of a company in the annual report<br>Mandatory usage of IAS or US GAAP. |
| 1998 | Law for Reinforcement of Control and Transparency (KonTraG) | Enhance control of the Supervisory Board over the Management Board.<br>Phase out Voting Caps. |
| 2000 | Corporate Governance Code | Presentation of the first proposition of a 'Code of Best.<br>Practice' to the German Government, undertooked by a panel of ten experts representing listed companies, auditors,<br>investors and legal practitioners. |
| 2002 | Corporate Governance Code | First Corporate Governance Code in Germany.<br>German companies were now obligated to comply at least annually with the Code or explain deviations. |
| 2009 | Corporate Governance Code | Capital market oriented companies need at least one independant supervisory or examination board member with knowledge.<br>Companies with more than 500 or 2000 employes need to have at least 1/3 or 1/2 of the members as their representatives on the Supervisory Board.<br>Supervisory board decides Executive board members.<br>Recommendation of more attention to diversity in board, hence more women.<br>Recommendation to have a limitation of variable salary part of a board manager should have an upper limit.<br>Every stocklisted company– need to have a yearly compliance statement.<br>Recommendation to present the Structure of remuneration of supervisory board is shown in annual report. |
| 2009-2013 | Corporate Governance Code | New Code every year with small adjustments. There has not been great changes since then. |

**Table 3. Law and Regulations Evolutions in Germany**

# Appendix 2.

| Company | |
|---|---|
| Adidas GR | RWE AG St |
| Kontron AG | Salzgitter AG |
| MorphoSys AG | SAP AG |
| Continental | Siemens AG |
| Bechtle AG | ThyssenKrupp AG |
| Drägerwerk AG & Co. KGaA Vz | TUI AG |
| Jenoptik AG | Volkswagen AG Vz |
| Pfeiffer Vacuum Technology AG | AIXTRON SE |
| QIAGEN N.V. | SolarWorld AG |
| QSC AG | United Internet AG |
| Software AG | Aurubis AG |
| BASF SE | Bilfinger SE |
| BAYER AG | Celesio AG |
| Beiersdorf Aktiengesellschaft | Deutsche EuroShop AG |
| BMW AG | EADS N.V. |
| DAIMLER AG | Fraport AG |
| Deutsche Lufthansa AG | GEA Group Aktiengesellschaft |
| Deutsche Post AG | HOCHTIEF AG |
| Deutsche Telekom AG | Hugo Boss AG |
| E.ON SE | Krones AG |
| Fresenius Medical Care AG & Co. KGaA St | Leoni AG |
| HeidelbergCement AG | ProSiebenSat.1 Media AG |
| Henkel AG & Co. KGaA Vz | PUMA SE |
| Infineon Technologies AG | Rheinmetall AG |
| K+S Aktiengesellschaft | RHÖN-KLINIKUM AG |
| LANXESS AG | SGL CARBON SE |
| Linde AG | Sky Deutschland AG |
| MAN SE St | STADA Arzneimittel AG |
| Merck KGaA | Südzucker AG |
| METRO AG St | Vossloh AG |
| WINCOR NIXDORF Aktiengesellschaft | |

**Table 4. Companies used in database**

| Dependent | Explanatory | | | Control Variables |
|---|---|---|---|---|
| ROE | Board Size | (a) Board Ownership (%) | Gender of CEO (Dummy Variable) | Market Capitalization |
| ROA | Non-Executive Directors (%) | (b) Director Ownership (€) | Age of CEO | Traded Volume (per year) |
| Sales Growth | Board Independence (%) | (a) Shareholder Concentration (Largest Shareolder % held) | CEO Tenure (Number of years being CEO) | Net Assets |
| EBITDA/Turnover | Female Board Members (Dummy Variable) | (b) Shareholder Concentration (Largest Shareolder with more than 5%) | Payout Ratio | Firm Size |
| Operating Margin | Female Board Members (%) | (c) Shareholder Concentration (Largest 5 Shareolders % held) | Dividends per share | Book D/E |
| Tobin´s Q | Employee Representation (% of Representatives on the board) | (a) Shareholder Concentration^2 | Audit Committee Existence (Dummy Variable) | Net Sales |
| Price to Book Ratio | CEO Cash Compensation (€) | (b) Shareholder Concentration^2 | Remuneration Committee Existence (Dummy Variable) | EBITDA |
| Stock return | Executive Board Fixed Remuneration (€) | (c) Shareholder Concentration^2 | Nominations Committee Existence (Dummy Variable) | Industry Business |
| PER = Market Value per share/ Earnings per share | Executive Board Variable Remuneration (€) | Type of Controling Shareholder | Supervisory Board Meetings Frequency | % of Free Float |
| | Supervisory Board Fixed Remuneration (€) | CEO/Chairman Dual Role (Dummy Variable) | Audit Committee Meetings Frequency | Auditted by a Big 4 Auditor |
| | Supervisory Board Variable Remuneration (€) | Executive Stock Compensation (Dummy Variable | | |

**Table 5. All Variables in database**

| Variable Name | Formula |
|---|---|
| ROE | Return on Equity (ROE) = Net Income (t) / Book Value of Equity (t -1) |
| ROA | Return on Assets (ROA) = (Operating Income after Depreciation)/(Year-End Total Assets) |
| Tobin's Q | Tobin' s Q = (Market value of assets)/(Book value of assets)= (Book value of assets+Market value of common equity-Book value of common equity- Deferred taxes )/(Book value of assets) |
| Board Size | Total number of Executive and Supervisory board members |
| Board Independence | Board Independence=(Number of independent directors)/(Total number of board members) |
| Employee Representatio | Board Employee Representation = Number of directors representing non-executive employees divided by the number of directors sitting on firm's board at year t |
| Percentage of Female Board Members | Percentage of Female Board Members = Number of Female Board Members / Total Board Members |
| Supervisory Board Variable Remuneration | Total Variable Remuneration of supervisory board members |
| Age of CEO | Age of the Chief Executive Officer |
| Board Ownership | Board Ownership = Capital owned by Board Members / Total stock of the firm |
| Shareholder Concentration | Shareholder Concentration = Stock held by the largest shareholder / Total stock of firm |
| Net Assets | Total Assets - Total Liabilities |
| Firm Size | Total assets at the end of the current financial year. |
| Largest 1* | Widely held (Companies in which the largest shareholder hold less than 10% of the total stock) |
| Largest 2 * | Family |
| Largest 3 * | State |
| Largest 4 * | Non Financial Institution |
| Largest 5 * | Financial Institution |
| Largest 6 * | Cross-holding |

**Table 6. Final Variables**

***** These are dummy variables. The variable is the type of shareholder that owns the company (ie the largest shareholder)

| Explanatory Variable | Expected Effect | Literature in favour | Literature against |
|---|---|---|---|
| Board Size | - | Jensen (1993); Anderson et al (2004) | Cole et al (2007); Adams & Mehran (2005) |
| Board Independence | - | Agrawal and Knoeber (1996); Bhagat & Black (2002); Bhagat and Bolton (2008); De Jong et al. (2005) | Jensen and Fama (1983); Renneboog (2000) |
| Percentage of Women on the Board of Directors | + | Carter, Simkins, & Simpson (2003); Borisova & Sterkhova (2012) | |
| Employee Representation on the Board of Directors | + | Guedri & Hollandts (2008) (The author finds na inverted U-shaped relation) | |
| Shareholder Concentration | + | La Porta et al (2000) | Demsetz & Lehn (1985) |
| Type of Ownership (Financial Institutions) | + | Silanes et al (1999); La Porta et al (2000); Weimer & Pape (1999) | |
| Age of CEO | + | (Child, 1974); Hart & Mellons, 1970 | Hambrick & Mason (1984); |
| Ownership Concentration | + | Berle and Means (1932); La Porta et al (2000) | Loderer and Martin (1997) |
| Supervisory Board Variable Remuneration | + | AFEP/MEDEF corporate governance code of good practices | Pfeffer (1980) |

**Table 7. Hypotheses**

Note: The supporting literature appoint to a relationship between the explanatory variable and the performance measure, not necessarily with the same expected effect as this research's hypotheses.

# Appendix 3.

| | |
|---|---|
| **Test:** | Hausman test |
| **Objective:** | Test if the unique errors (ui) are correlated with the regressors |
| **Null Hypotheses:** | Difference in coefficients not systematic |

| | Dependent Variable | | |
|---|---|---|---|
| | **ROE** | **ROA** | **Tobin's Q** |
| **Results:** | chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 2.72 | chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 14.30 | chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 26.33 |
| | Prob>chi2 = 0.9939 | Prob>chi2 = 0.2168 | Prob>chi2 = 0.0097 |
| **Conclusion:** | One should use RE | One should use RE | One should use FE |

**Table 8. Hausman Test**

| Test: | Breusch and Pagan Lagrangian multiplier test for random effects |
|---|---|
| Objective: | Decide between a Random effects regression and a simple OLS |
| Null Hypotheses: | Variances across entities being zero |

| | Dependent Variable | |
|---|---|---|
| | ROE | ROA |
| Results: | chibar2(01) = 4.04 | chibar2(01) = 142.39 |
| | Prob > chibar2 = 0.0222 | Prob > chibar2 = 0.0000 |
| Conclusion: | One shoud use Random Effects | One shoud use Random Effects |

**Estimated Results:**

| Var | Var | sd=sqrt (Var) |
|---|---|---|
| ROE | 0,01082 | 0,10400 |
| e | 0,00590 | 0,07681 |
| u | 0,00325 | 0,05704 |

| Var | Var | sd=sqrt (Var) |
|---|---|---|
| ROE | 0,01082 | 0,10400 |
| e | 0,00590 | 0,07681 |
| u | 0,00325 | 0,05704 |

**Table 9. Breusch-Pagan Test for Random effects**

| Test: | Breusch-Pagan / Cook-Weisberg test for heteroskedasticity |
|---|---|
| Objective: | Test if the Conditional variance of Yt given Xt is not constant |
| Null Hypotheses: | Constant variance |

| | Dependent Variable: | | |
|---|---|---|---|
| | ROE | ROA | Tobin's Q |
| Results: | chi2(1) = 17.43 | chi2(1) = 13.85 | chi2(1) = 22.69 |
| | Prob > chi2 = 0.0001 | Prob > chi2 = 0.0002 | Prob > chi2 = 0.0000 |
| Conclusion: | The model has Heteroskedasticity | The model has Heteroskedasticity | The model has Heteroskedasticity |

**Table 10. Breusch-Pagan Test for Heteroskedasticity**

| | |
|---|---|
| **Test:** | Wooldridge test for autocorrelation in panel data |
| **Objective:** | Test if there is correlation between values of the process at different times (First order correlation) |
| **Null Hypotheses:** | No first-order autocorrelation |

| | **Dependent Variable:** | | |
|---|---|---|---|
| | **ROE** | **ROA** | **Tobin's Q** |
| **Results:** | F( 1, 25) = 10.417 | F( 1, 25) = 7.972 | F( 1, 23) = 35.870 |
| | Prob > F = 0.0035 | Prob > F = 0.0092 | Prob > F = 0.0000 |
| **Conclusion:** | The data has first order correlation | The data has first order correlation | The data has first order correlation |

**Table 11. Wooldridge Test for Autocorrelation**

# Appendix 4.

| Variable | Mean | Median | Min | Max |
|---|---|---|---|---|
| ROE | 0,14 | 0,14 | -0,19 | 0,47 |
| ROA | 0,08 | 0,07 | -0,10 | 0,23 |
| Tobin's Q | 1,32 | 1,26 | 0,52 | 2,63 |
| Board Size | 18,3 | 18 | 5 | 31,00 |
| Board Independence | 0,55 | 0,6 | 0,14 | 0,91 |
| Employee Representation | 0,49 | 0,5 | 0,29 | 0,6 |
| Percentage of Female Board Members | 0,07 | 0,06 | 0 | 0,36 |
| Supervisory Board Variable Remuneration | 536.977 | 139.100 | 0 | 8.125.886 |
| Age of CEO | 53,47 | 54 | 32 | 71 |
| Board Ownership | 0,09 | 0,01 | 0 | 0,75 |
| Shareholder Concentration | 0,24 | 0,17 | 0 | 0,97 |
| Net Assets* | 7003,10 | 2199,50 | 42,00 | 81825,00 |
| Firm Size | 9,80 | 9,78 | 7,90 | 11,49 |
| Largest 1 - Widely Held ** | 129 | | | |
| Largest 2 - Family ** | 107 | | | |
| Largest 3 - State ** | 32 | | | |
| Largest 4 - Non-Financial Institution ** | 150 | | | |
| Largest 5 - Financial Instituion ** | 62 | | | |
| Largest 6 - Cross-holding ** | 8 | | | |

*Values in KEUR

** These are dummy variables. The variable is the type of shareholder that owns the company (ie the largest shareholder). For this variable, the values are the frequency of their appearance.

**Table 12. Descriptive Statistics**

| Option | SE estimates are robust to disturbances being | Notes |
|---|---|---|
| `robust` | heteroscedastic | |
| `cluster()` | heteroscedastic and autocorrelated | |
| | autocorrelated with AR(1)[1] | |
| | heteroscedastic and autocorrelated of type MA($q$)[2] | |
| `panels()`, `corr()` | heteroscedastic, contemporaneously cross-sectionally correlated, and autocorrelated of type AR(1) | $N < T$ required for feasibility; tends to produce optimistic SE estimates |
| `correlation()` | heteroscedastic, contemporaneously cross-sectionally correlated, and autocorrelated of type AR(1) | large-scale panel regressions with `xtpcse` take a lot of time |
| | heteroscedastic, autocorrelated with MA($q$), and cross-sectionally dependent | |

[1] AR(1) refers to first-order autoregression
[2] MA($q$) denotes autocorrelation of the moving average type with lag length $q$.

**Table 13. Selection of Stata commands and options that produce robust standard error estimates for linear panel models.**

Retrieved from: Hoeche, D. (2007). Robust standard errors for panel regressions with cross sectional dependence. *The Stata Journal*, 7, Number 3, pp. 281-312.

| OLS Regression | ROE | | | ROA | | | Tobin's Q | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | Std. Err. | P>t | Coef. | Std. Err. | P>t | Coef. | Std. Err. | P>\|t\| |
| Board Size | 0,000 | 0,003 | 0,89 | 0,000 | 0,001 | 0,96 | -0,022 | 0,010 | 0,04 |
| Board Independence | -0,069 | 0,038 | 0,07 | -0,013 | 0,018 | 0,48 | -0,282 | 0,142 | 0,05 |
| Employee Representation | 0,106 | 0,048 | 0,03 | 0,010 | 0,024 | 0,67 | -0,043 | 0,180 | 0,81 |
| Percentage of Female Board Members | -0,021 | 0,021 | 0,32 | -0,003 | 0,010 | 0,76 | -0,086 | 0,075 | 0,26 |
| Supervisory Board Variable Remuneration | 0,000 | 0,000 | 0,00 | 0,000 | 0,000 | 0,00 | 0,000 | 0,000 | 0,04 |
| Age of CEO | 0,004 | 0,001 | 0,00 | 0,002 | 0,000 | 0,00 | 0,005 | 0,004 | 0,17 |
| Board Ownership | -0,118 | 0,056 | 0,04 | -0,039 | 0,026 | 0,13 | -0,178 | 0,238 | 0,46 |
| Shareholder Concentration | 0,150 | 0,043 | 0,00 | 0,092 | 0,020 | 0,00 | 0,439 | 0,144 | 0,00 |
| Net Assets | 0,000 | 0,000 | 0,08 | 0,000 | 0,000 | 0,06 | 0,000 | 0,000 | 0,45 |
| Firm Size | -0,073 | 0,019 | 0,00 | -0,038 | 0,010 | 0,00 | -0,152 | 0,078 | 0,05 |
| Largest 1 - Widely Held | -0,037 | 0,034 | 0,28 | 0,120 | 0,023 | 0,00 | 0,465 | 0,171 | 0,01 |
| Largest 2 - Family | -0,072 | 0,037 | 0,05 | 0,090 | 0,024 | 0,00 | 0,247 | 0,183 | 0,18 |
| Largest 3 - State | 0,000 | (omitted) | | 0,104 | 0,028 | 0,00 | 0,514 | 0,204 | 0,01 |
| Largest 4 - Non-Financial Institution | -0,111 | 0,036 | 0,00 | 0,100 | 0,024 | 0,00 | 0,329 | 0,178 | 0,07 |
| Largest 5 - Financial Instituion | -0,028 | 0,039 | 0,48 | 0,119 | 0,025 | 0,00 | 0,655 | 0,182 | 0,00 |
| Largest 6 - Cross-holding | -0,244 | 0,058 | 0,00 | 0,000 | (omitted) | | 0,000 | (omitted) | |
| _cons | 0,640 | 0,154 | 0,00 | 0,225 | 0,076 | 0,00 | 2,634 | 0,605 | 0,00 |

| | ROE | ROA | Tobin's Q |
|---|---|---|---|
| Number of obs = | 190 | 188 | 179 |
| F( 15, 174) = | 6,61 | 7,19 | 9,33 |
| Prob > F = | 0,000 | 0,000 | 0,000 |
| R-squared = | 0,363 | 0,385 | 0,4618 |
| Adj R-squared = | 0,308 | 0,332 | 0,4123 |
| Root MSE = | 0,087 | 0,041 | 0,30257 |

**Table 14. OLS Regressions**

| FE/RE Estimator | ROE | | | ROA | | | Tobin's Q | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | Std. Err. | P>z | Coef. | Std. Err. | P>z | Coef. | Std. Err. | P>t |
| Board Size | -0,001 | 0,003 | 0,72 | 0,000 | 0,001 | 0,71 | 0,001 | 0,010 | 0,91 |
| Board Independence | -0,086 | 0,064 | 0,18 | -0,031 | 0,034 | 0,36 | -0,983 | 0,464 | 0,04 |
| Employee Representation | 0,101 | 0,076 | 0,19 | 0,055 | 0,039 | 0,16 | 1,064 | 0,456 | 0,02 |
| Percentage of Female Board Members | -0,046 | 0,028 | 0,10 | -0,022 | 0,011 | 0,05 | -0,164 | 0,096 | 0,09 |
| Supervisory Board Variable Remuneration | 0,000 | 0,000 | 0,00 | 0,000 | 0,000 | 0,00 | 0,000 | 0,000 | 0,01 |
| Age of CEO | 0,004 | 0,001 | 0,00 | 0,002 | 0,001 | 0,00 | 0,008 | 0,006 | 0,20 |
| Board Ownership | -0,200 | 0,090 | 0,03 | -0,098 | 0,048 | 0,04 | -0,365 | 0,758 | 0,63 |
| Shareholder Concentration | 0,117 | 0,060 | 0,05 | -0,002 | 0,024 | 0,94 | 0,660 | 0,208 | 0,00 |
| Net Assets | 0,000 | 0,000 | 0,11 | 0,000 | 0,000 | 0,66 | 0,000 | 0,000 | 0,07 |
| Firm Size | -0,079 | 0,025 | 0,00 | -0,056 | 0,012 | 0,00 | -0,446 | 0,128 | 0,00 |
| Largest 1 - Widely Held | 0,187 | 0,078 | 0,02 | 0,062 | 0,047 | 0,19 | 0,136 | 0,083 | 0,11 |
| Largest 2 - Family | 0,220 | 0,082 | 0,01 | 0,082 | 0,048 | 0,09 | 0,110 | 0,129 | 0,40 |
| Largest 3 - State | 0,255 | 0,092 | 0,01 | 0,091 | 0,055 | 0,10 | 0,000 (omitted) | | |
| Largest 4 - Non-Financial Institution | 0,130 | 0,079 | 0,10 | 0,039 | 0,047 | 0,41 | 0,000 (omitted) | | |
| Largest 5 - Financial Instituion | 0,217 | 0,081 | 0,01 | 0,061 | 0,048 | 0,20 | 0,172 | 0,106 | 0,11 |
| Largest 6 - Cross-holding | 0,000 (omitted) | | | 0,000 (omitted) | | | 0,000 (omitted) | | |
| _cons | 0,492 | 0,224 | 0,03 | 0,477 | 0,115 | 0,00 | 5,349 | 1,201 | 0,00 |

| | | | |
|---|---|---|---|
| R-sq: within | 0,2963 | 0,2792 | 0,3102 |
| sigma_u | 0,0570 | 0,0406 | 0,4743 |
| sigma_e | 0,0768 | 0,0249 | 0,1853 |
| rho | 0,3554 | 0,7262 | 0,8676 |

**Table 15. Fixed & Random Effects**

| FE/RE Clustered Data | ROE | | | ROA | | | Tobin's Q | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef. | Std. Err. | P>\|t\| | Coef. | Std. Err. | P>\|t\| | Coef. | Std. Err. | P>\|t\| |
| Board Size | -0,001 | 0,004 | 0,78 | 0,000 | 0,001 | 0,75 | 0,001 | 0,013 | 0,93 |
| Board Independence | -0,086 | 0,061 | 0,16 | -0,031 | 0,042 | 0,46 | -0,983 | 0,670 | 0,15 |
| Employee Representation | 0,101 | 0,068 | 0,03** | 0,055 | 0,031 | 0,042** | 1,064 | 0,300 | 0,001*** |
| Percentage of Female Board Members | -0,046 | 0,028 | 0,10 | -0,022 | 0,015 | 0,14 | -0,164 | 0,094 | 0,09 |
| Supervisory Board Variable Remuneration | 0,000 | 0,000 | 0*** | 0,000 | 0,000 | 0,01*** | 0,000 | 0,000 | 0,035** |
| Age of CEO | 0,004 | 0,002 | 0,005*** | 0,002 | 0,001 | 0,021** | 0,008 | 0,006 | 0,19 |
| Board Ownership | -0,200 | 0,110 | 0,069* | -0,098 | 0,059 | 0,096* | -0,365 | 0,512 | 0,48 |
| Shareholder Concentration | 0,117 | 0,065 | 0,072* | -0,002 | 0,020 | 0,93 | 0,660 | 0,240 | 0,013** |
| Net Assets | 0,000 | 0,000 | 0,14 | 0,000 | 0,000 | 0,79 | 0,000 | 0,000 | 0,13 |
| Firm Size | -0,079 | 0,036 | 0,03 | -0,056 | 0,015 | 0,00 | -0,446 | 0,132 | 0,00 |
| Largest 1 - Widely Held | 0,187 | 0,046 | 0,00*** | 0,062 | 0,030 | 0,041** | 0,136 | 0,089 | 0,14 |
| Largest 2 - Family | 0,220 | 0,055 | 0,00*** | 0,082 | 0,029 | 0,004*** | 0,110 | 0,179 | 0,55 |
| Largest 3 - State | 0,255 | 0,067 | 0,00*** | 0,091 | 0,033 | 0,006*** | 0,000 | (omitted) | |
| Largest 4 - Non-Financial Institution | 0,130 | 0,057 | 0,022** | 0,039 | 0,029 | 0,18 | 0,000 | (omitted) | |
| Largest 5 - Financial Instituion | 0,217 | 0,050 | 0,00*** | 0,061 | 0,030 | 0,044** | 0,172 | 0,140 | 0,23 |
| Largest 6 - Cross-holding | 0,000 | (omitted) | | 0,000 | (omitted) | | 0,000 | (omitted) | |
| _cons | 0,492 | 0,260 | 0,06 | 0,477 | 0,139 | 0,00 | 5,349 | 1,338 | 0,00 |

| R-sq: | ROE | ROA | Tobin's Q |
|---|---|---|---|
| **within =** | 0,5963 | 0,5792 | 0,6102 |
| **between =** | 0,6326 | 0,5307 | 0,5895 |
| **overall =** | 0,5326 | 0,5163 | 0,4993 |

**Table 16. Fixed & Random Effects with Clustered data**

***, **, *, are significance levels of 1%, 5% and 10% respectively.